

Standards challenges for low-flow streams

Washington Department of Ecology
Water Quality Program
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The History

- Ecology, especially in the Eastern Region, recognized some TMDLs would be complicated by low-flow and intermittent conditions (circa 2009)
 - Water quality standards do not consider natural variability resulting from flow extremes
 - Natural conditions likely different than numeric criteria
- TMDLs put on hold because natural flow conditions preclude the ability of the stream to meet the designated numeric criteria
 - Remaining temperature, DO, pH TMDLs likely have issues due to flow conditions (even on some perennial streams)
 - Result: many 303(d) listings unaddressed

The Problem

Year round criteria
for all flow conditions



Photo credit: Jonathon Fox

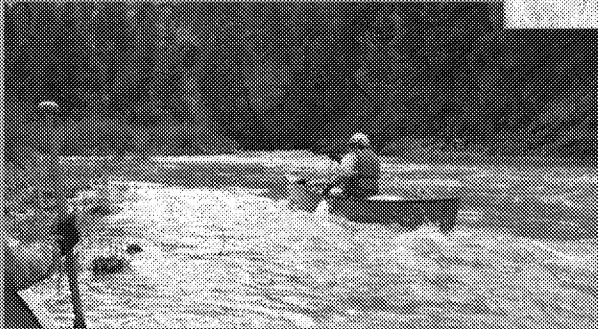


Photo credit: Spokesman.com

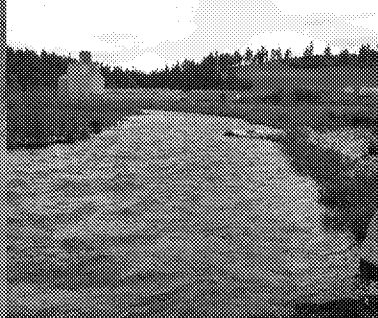
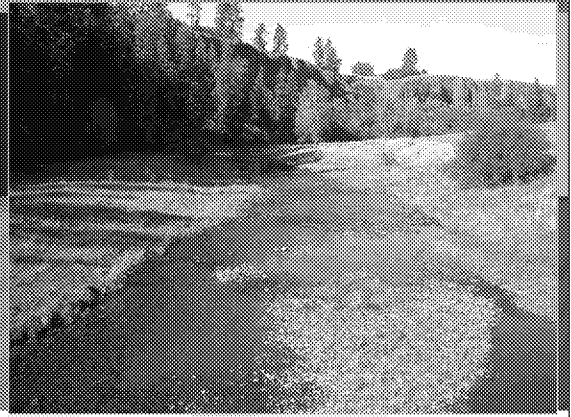
↑ Shallow/stagnant/receding from
canopy/higher temperatures

← High flow/aeration/cool
temperatures

Other examples



Tributary to Crab Creek



Palouse River - not intermittent, but shallow wide, and very different seasonally

The Challenges

- Modeling often shows restored natural condition would not meet numeric water quality criteria
- Results in permit limits to achieve the unnatural water quality criteria
 - Technology not always available to achieve
 - Very expensive infrastructure costs
 - Passed on to communities' citizens
 - Towns that discharge to these variable streams often lower socioeconomic conditions
- Natural Conditions in TMDLs
 - Post Oregon decision need a robust way to document natural conditions determinations

Proposal

- “Performance-based approach to site-specific criteria development”
- Prescribed methodology incorporated into the water quality standards and then used to develop water quality criteria based on defensible determination of natural conditions
- Consistent with EPA guidance published in February 2015 Document and 2000 Federal Register
- Two tracks
 - non-ESA waters: new criteria would not require ESA consultation and EPA review can be expedited.
 - ESA waters: Performance-based process strengthens basis for site-specific criteria rule change but may require consultation → longer EPA review process.

Proposal - continued

- Use methodology to develop criteria that more accurately match a given parameter's natural condition or regime under restored natural conditions
- Designated use is not changed (not a UAA)
- Standardizes process to credibly determine the natural condition or regime for specific parameters
- Documents new criteria (numeric criteria and seasons if applicable) within the WQ Standards waterbody-specific rules (Table 602).
- Requires multiple state rulemaking processes
 - To incorporate procedure into WQS
(one time)
 - To designate new criteria for individual water bodies
(for each waterbody -or- group of waterbodies)

Performance-based approach

Flowchart elements

Use a universal
“modeling
considerations
checklist”

- Questions to ensure using right tool (perhaps a UAA is more appropriate)
- Decide track (ESA vs non-ESA)
- Define boundary where will new criteria apply
- Define duration criteria apply
- Define frequency
- Define magnitude (numeric criteria)
- Rulemaking
- Public participation
- Incorporation into WQ standards

Modeling Conditions Checklist

- **Purpose:** To prescribe all elements critical to credibly determine the natural condition or regime for a given parameter when developing:
 - a site-specific criteria in rule
 - TMDL load allocations
- **Instructions:** All elements of a prescribed natural condition analysis must be considered when determining the natural condition or regime of a parameter.
 - *If a required element is deemed not critical in a particular analysis, an explanation why it was not included must be provided.*
 - Other situation specific elements not listed will be considered if deemed important.
 - Additionally, how the element was applied in modeling scenarios must be documented.

Modeling Conditions Checklist

- System potential shade
- Microclimate
- Channel morphology changes
- Flow reductions or increases
- Hydromodifications (dams, weirs)
- Point source effluent
- Nonpoint sources
- Natural nutrient concentrations; legacy contamination
- Invasive species
- Biological measure or indices

What proposal doesn't address

- Effluent-dominated streams
- Flow augmented streams (irrigation return)
- Manmade water bodies
- Will still have facilities that will need to remove discharge because there is not enough capacity or dilution to accept effluent

Schedule

- We are considering Hangman Creek DO/pH TMDL modeling to test the performance-based approach and modeling checklist
- Asking Environmental Assessment Program to use checklist on all future TMDL modeling
- Simultaneous rulemaking to incorporate performance-based approach and first set of seasonal site-specific criteria (Hangman Creek)
- First set of site specific criteria will not be completed until late 2018 at the earliest

Potential Future Alternative

- Threshold critical low flow below which numeric criteria do not apply or an alternative criteria applies
 - Develop a scientifically supported critical low flow threshold
 - e.g. when 7Q2 is below X cfs, the numeric criteria do not apply or other numeric criteria apply
 - Implement through a provision in the standards to apply across all streams for dissolved oxygen, pH, and temperature criteria

Threshold Critical Low-Flow

Pros

- Potentially a single statement that could be added to the WQS to address extreme low flows
- Single rule change; Would not require UAAs or site-specific rulemaking
- If written correctly would only affect low flow streams with no impact to perennials
- Takes into consideration fish's natural timing of stream or refugia use
- Could allow dischargers to stay in the river during lower flows reducing seasonal storage needs (and costs)
- Addresses those DO impacts that are due to low-flow/ higher natural temperatures vs. nutrient problems

Cons

- May be difficult to determine a single threshold flow
- Could be perceived as weakening the standards